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Ambiguity and risk measures in the lab and students' real-life borrowing behavior

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ABSTRACT

This study analyzes the external validity of experimentally elicited ambiguity aversion, likelihood insensitivity and risk aversion on real-life decision-making in the field of student loans. Our main finding is that ambiguity aversion, likelihood insensitivity and risk aversion are not related to the decision to take out a student loan nor to the amount students decide to borrow, conditional on having a loan. We discuss our results in the context of recent advances to relate lab measures of ambiguity aversion and likelihood insensitivity to real economic decisions.

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1. Introduction

Since the publication of the well-known Ellsberg paradox (1961), ambiguity aversion has been found and replicated in many laboratory studies (Trautmann and van de Kuilen, 2015). Ambiguity aversion is a preference for risky over ambiguous prospects that are equivalent under subjective expected utility. Several theoretical models have been developed that include parameters for ambiguity aversion to explain real-life individual and market behavior and anomalies in areas such as portfolio choices (Dow and Werlang, 1992; Easley and O'Hare, 2009), market microstructure (Easley and O'Hare, 2010; Ozsoylev and Werner, 2009), home country bias (Uppal and Wang, 2003) and break-down of trading, which occurred during the recent financial crisis (Guidolin and Rinaldo, 2013). Although these theoretical models seem promising, the reality is that few experimental studies have found a clear relationship between individually elicited ambiguity aversion in the lab and real-life behavior (Trautmann and van de Kuilen, 2015). To a certain extent the same limitation also applies to risk preferences, where many studies provide mixed evidence for a direct link between individuals' lab-elicited risk preferences and related decision-making in real life (Friedman et al., 2014; Trautmann, 2016).

Research on the predictive power of experimentally elicited ambiguity aversion is restricted to only a handful of studies. In the field of developmental economics, Warnick et al. (2011) find negative effects of ambiguity aversion on the adoption of new varieties of crop in Peruvian farmers and Ross et al. (2012) report a negative relationship between ambiguity aversion and the adoption of new variety of rice. For ambiguity aversion, as well as risk aversion, Sutter et al. (2013) find only a weak correlation with real-life decision-making in adolescents. Dimmock et al. (2016a) report a positive correlation between ambiguity aversion and stock market participation in the US, but in a very similar study in the Netherlands this relationship only holds for subjects who perceive stock returns as highly ambiguous (Dimmock et al., 2016b).

We also investigate the external validity of likelihood insensitivity, which is a modeling framework often discussed in the context of ambiguity aversion (Abdellaoui et al., 2011). Likelihood insensitivity describes people's tendency to weight probabilities non-linearly. Specifically, people tend to overweight low likelihood events, also referred to as the 'possibility effect', and underweight

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high likelihood events, which is known as the 'certainty effect' (Wakker, 2010). This tendency affects ambiguity preferences in opposite directions: people are generally more ambiguity seeking in the context of low likelihood events and more ambiguity averse in the context of high likelihood events. Regarding the external validity of likelihood insensitivity, a similar picture as with ambiguity aversion and risk aversion emerges: evidence for a clear relationship between lab measurements and real-life behavior is hard to find (Dimmock et al., 2016b). To the best of our knowledge, Dimmock et al. (2016b) is the only study that relates likelihood insensitivity to real economic decisions. They report a negative relation between likelihood insensitivity and stock market participation, but, interestingly, not for ambiguous situations like self-employment or private business ownership.

Overall, the link between experimentally elicited ambiguity aversion, likelihood insensitivity and decision-making in real life is mixed and findings do not seem to replicate reliably, which is a serious issue for policy recommendations. The emerging literature on the external validity of the aforementioned experimental measures shows that there is a need for more research in this area (also see Trautmann and van de Kuilen, 2015). We contribute to this literature by investigating the relationship between ambiguity aversion, risk aversion, likelihood insensitivity and student borrowing behavior of 233 students in the Netherlands. Student borrowing is an important policy instrument for the Dutch government (see next section) and elsewhere. Although a substantial share of students (35%) in the Netherlands take out student loans (Kreetz et al., 2012), the majority prefers to finance their studies with a part-time job. As part-time jobs affect the total amount of time spent on studying the average study duration in the Netherlands is nearly six years, while most curriculums are designed for four yours only (Oosterbeek and van den Broek, 2009). This situation can be mitigated with student loans and is not unique to the Netherlands. Countries like UK, US and Australia face similar problems. In fact, in many of these countries students face much higher education and admission fees compared to the Netherlands, which aggravates the problem for students who want to avoid loans (Institute for Higher Education Policy, 2008).

A number of studies focus on debt aversion amongst students. Fear of debt and the prospect of accumulating debt can even influence the decision to study in the first place. This is especially prevalent among low socio-economic groups (Callender and Jackson, 2005, 2008). The majority of studies measure debt aversion and determinants for debt aversion with survey items like 'owing money is basically wrong', 'there is no excuse for borrowing money', or proxy questions like 'do you usually pay off your credit card balances each month (conditional on having any)?'. It is not clear whether these survey questions refer to risk aversion, ambiguity aversion, or other related components. The study of Eckel et al. (2007) is a notable exception. The authors experimentally elicit debt aversion as well as risk and time preferences with Canadian adults. The authors find "no evidence that debt aversion is an important barrier to investment in postsecondary education" (p. 234). They do find, however, that risk-seeking and patient persons are more likely to take up education financing, supporting the notion that investing in education is a relatively risky choice. In this study we therefore also elicit risk preferences and analyze the relationship between risk aversion measured in the lab and student borrowing behavior.

Although we also measure risk aversion to complement previous research, our primary argument in this study is that taking out student loans is less about risk and more about ambiguity, where probabilities for possible states are not known. We argue that students' aversion to borrow may be primarily driven by their aversion to the ambiguous conditions of a student loan. As explained in more detail in the next section, Dutch students face a multitude of ambiguous elements in the decision to take out a loan. For example, the total debt outstanding cannot be precisely assessed because student loan interest rates are floating and unknown. Students are therefore uncertain if and to which extent receiving the loan will outweigh the ease and cost of repayment and benefit their study and study duration. This might explain why the majority of Dutch students prefer to have a part-time job to finance their studies. Graduation and a decent job most likely ensure that students will have no serious problem to repay their debts, but both these events – graduation and obtaining a job with a sufficient income – are several years and numerous ambiguous events away. Yet students have to decide at the start of their study program whether to take out a student loan and, importantly, how much. The higher the stakes, the more confident a student needs to be that the student loan is a worthwhile investment to finance their study and generate the expected income and career as a result (Hill, 2013). Accordingly, we expect that students who are more ambiguity averse will borrow less than other students.

In addition to the effect of ambiguity aversion we argue that likelihood insensitivity can affect borrowing behavior when students perceive the probability to benefit from taking out a loan (including ease of loan repayment) as a high likelihood event. Note that students can freely decide on the loan amount and borrow very small and easily repayable amounts, for example, as additional 'pocket money' when they decided to primarily finance their studies through part-time jobs. Hence, we assume that students consider it to be likely that a loan will benefit their study and that this benefit will outweigh the burden of repayment. We therefore expect that students with likelihood insensitivity will underweight the high probability that the loan will benefit them and hence overweight the costs associated with this type of student financing. Hence, we predict that students who exhibit high likelihood insensitivity will try to either refrain from borrowing completely, or borrow as little as possible.

We use recent methods to elicit ambiguity aversion, risk aversion and likelihood insensitivity in a well-controlled laboratory setting and relate it to a real financial decision, student borrowing, which has ambiguous features and is relevant for all participants in our experimental population. We elicit ambiguity aversion and likelihood insensitivity based on matching probabilities of three uncertain events with the following likelihoods: 0.1, 0.5 and 0.9 (Abdellaoui et al., 2011; Dimmock et al., 2016b; Dimmock et al., 2016a). After this elicitation procedure, students answer a variety of questions concerning their borrowing behavior. We find both ambiguity aversion and likelihood insensitivity in our sample. 33% of our participants have a student loan, which is in line with representative samples (Biermans and Budil-Nadvorníková, 2003; van den Broek and van de Wiel, 2005; Oosterbeek and van den Broek, 2009). Our main finding is that ambiguity aversion, likelihood insensitivity and risk aversion are not related to the decision to take out a student loan nor to the amount they decide to borrow conditional on borrowing. In the last section of this paper we discuss the implications of these findings.

2. Student loans in the Netherlands

In the Netherlands, students can get two kinds of financial support from the government: a basic scholarship and a student loan. Most students receive a basic government scholarship. The exact amount depends on the individual's and family's wealth and income level. Students receive the basic scholarship for up to four years, because the majority of curriculums are set up as four-year programs (three years bachelor; one year master). Next to this scholarship, almost all students are able to take out student loans that are subsidized and issued by the government. Students can borrow up to €301.27 per month. After four years of study, when

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